CLAIMS

We claim:

1. In a latent heat storage device including a salt case, inlet and outlet conduits extending from the exterior of the outer jacket to the interior of the salt case, at least one tube within the salt case and having a plurality of straight parallel runs defining a matrix with an exterior, and a phase change material sealed within said at least one tube, the improvement wherein the runs are laid out in an equilateral polygonal pattern with each run inwardly of said matrix exterior abutting a plurality of adjacent runs and each run at the exterior of said matrix additionally engaging said salt jacket, said runs having a cross-sectional shape such that flow spaces exist between said runs, said flow spaces being in fluid communication with said inlet and outlet conduits.

2. The latent heat storage device of claim 1 wherein each of said runs is defined by an individual tube.

3. The latent heat storage device of claim 1 wherein each of said tubes is of circular cross-section.

4. The latent heat storage device of claim 1, wherein said tubes are brazed together to form a tube matrix.

5. The latent heat storage device of claim 1, wherein said tubes are brazed together and to the inner wall of said salt case in a pattern of brazed connections that are cyclically uniform and repetitive.

6. The latent heat storage device of claim 1 wherein said regular polygonal pattern is a closely packed hexagonal pattern.

7. The latent heat storage device of claim 6 wherein said runs are circular in cross-section, each of said runs having six contact points with other runs or said salt jacket.

8. The latent heat storage device of claim 7 wherein said salt jacket includes a plurality of parallel, elongated, inwardly directed spaced ribs, said runs having spaced centers, the spacing between said ribs being the same as the spacing between said centers, the runs on said matrix exterior being nested between two adjacent ribs and each having one of said contact points with each of said two adjacent ribs.

9. The latent heat storage device of claim 8 wherein said contact points are angularly spaced by about 60°.

10. The latent heat storage device of claim 1 further including a baffle extending through said matrix between said runs; said inlet conduit being connected to said salt case on one side of said baffle, said outlet conduit being connected to said salt case on the other side of said baffle.

11. The latent heat storage device of claim 1 wherein said flow spaces also exist between the tubes on the exterior of said matrix and said salt jacket.

12. The latent heat storage device of claim 1 further including an outer jacket surrounding said salt case in spaced relation to define an insulating space between said salt jacket and said outer jacket, said inlet and outlet conduits extending from the exterior of the outer jacket to the interior of the salt case.

13. In a latent heat storage device including a salt case, inlet and outlet conduits extending to the interior of the salt case, at least one tube within the salt case and having a plurality of straight parallel runs defining a matrix with an exterior, and a phase change material sealed within said at least one tube, the improvement wherein the runs are in an equilateral polygonal pattern with each run inwardly of said matrix exterior abutting a plurality of adjacent runs and each run at the exterior of said matrix additionally engaging said salt jacket, said runs having a cross-sectional shape such flow spaces exist between said runs, said flow spaces being in fluid communication with said inlet and outlet conduits, said salt jacket including a plurality of parallel, inwardly directed, spaced, elongated ribs on centers spaced a distance equal to the spacing between the centers of said runs, said runs on the exterior of said matrix being nested between corresponding ones of said ribs and engaging said ribs along their respective lengths.

14. The latent heat storage device of claim 13 wherein said runs are defined by individual tubes of circular cross-section, and said equilateral polygonal pattern is a regular, hexagonal pattern, each tube having six contact points with other adjacent tubes or with said salt jacket on and between said ribs.

15. The latent heat storage device of claim 14 wherein said contact points are angularly spaced about the periphery of each tube by about 60°.

16. The latent heat storage device of claim 13 including an outer jacket surrounding said salt jacket in spaced relation to define an insulating space and said salt jacket is spaced from said outer jacket by a plurality of standoffs.

17. The latent heat storage device of claim 13 wherein said outer jacket includes a plurality of strengthening ribs.

18. The latent heat storage device of claim 17 wherein said salt jacket comprises two channel shaped elements surrounding and contacting said matrix, and

sealed to one another, and end plates or caps at each end of said matrix and sealed to said channel shaped elements, said end plates or caps being provided with strengthening ribs.

19. The latent heat storage device of claim 13 wherein said salt jacket comprises two channel shaped elements surrounding and contacting said matrix, and sealed to one another, and end plates or caps at each end of said matrix and sealed to said channel shaped elements, said end plates or caps being provided with strengthening ribs.

20. In a latent heat battery including a salt case, an outer jacket surrounding said salt case in spaced relation thereto to define an insulating space between the salt case and the outer jacket, inlet and outlet conduits extending from the exterior of the outer jacket to the interior of the salt case, at least one tube within the salt case and having a plurality of straight parallel runs defining a matrix with an exterior, and a phase change material sealed within said at least one tube, the improvement wherein the runs are laid out in an equilateral polygonal pattern with each run inwardly of said matrix exterior abutting a plurality of adjacent runs and each run at the exterior

shape such that flow spaces exist between said runs, said flow spaces being in fluid communication with said inlet and outlet conduits.